Crop Production News
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CROPS

EDITOR'S COMMENTS

By Sean Miller, PAg
Provincial Specialist, Plant Disease

The focus on insects and crop diseases will continue throughout July. The Crop Protection Laboratory has been busy of late with samples of these pests, and other causes of crop damage. For information on how to submit a sample to the lab, go to Saskatchewan Agriculture's website at: www.agriculture.gov.sk.ca/Crop_Protection_Lab.

REMEMBER TO FOLLOW PRE-HARVEST INTERVAL GUIDELINES WHEN APPLYING CROP PROTECTION PRODUCTS.

Pre-harvest intervals (PHIs) must be followed to ensure the maximum residue levels are not exceeded in the harvested crop. The PHI is the number of days that must pass between the last application of a pesticide and harvest. Harvest is defined as the cutting of the crop or the removal of the product from the plant. This includes direct-combining, cutting (swathing) or grazing; it does not include combining swaths or baling for hay. Refer to the crop protection product label or the product information in the 2013 Guide to Crop Protection for more information on specific PHIs.

For an update on provincial crop progress throughout the growing season, see the weekly Crop Report at www.agriculture.gov.sk.ca/Crop-Report or on Twitter at @SKGovAg.

Crop Production News is a bi-weekly publication prepared primarily by provincial specialists with the Crops and Irrigation and Regional Services branches of the Saskatchewan Ministry of Agriculture. It is a compilation of articles related to entomology, plant pathology, weed science, soils and agronomy issues.

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Fungicides and Irrigation Scheduling

By Garth Weiterman, PAg
Manager, Agronomy Services

Dry field bean.
Photo courtesy of Ministry of Agriculture

Fungicide use has become common place in almost all irrigated crop rotations. High yield environments, as afforded by irrigation, predispose crops to disease pressure. Minimizing yield depression is the goal. Following application guidelines for proper fungicide timing is essential.

When targeting high yields, it is generally recommended to maintain soil moisture at an optimum level of at least 75 per cent field capacity. This allows some room in the profile to accept rainfall, if you are fortunate enough to get it when you need it. However, there will be times when irrigation has just occurred, the profile is full, and we receive additional rain. Depending on the volume of application made, this could lead to short periods of excess and internal drainage loss from the active rooting zone. Our experience has generally shown that irrigators could apply more irrigation water to prevent a dry zone developing below the wetting front.

Canola is a high water use crop having a seasonal water use of 430 millimeters. Fungicide application has to be coordinated with irrigation to allow it to be made in a timely manner and still keep up with crop water demand. This means filling the profile by the time the crop begins to flower. The fungicide is applied and then irrigation resumes before 50 per cent of the available water has been used.

For fusarium head blight management in cereals, common practice is to fill the soil profile before application of fungicide. Fungicide is applied and irrigation held off for a week to 10 days during the flowering period. Depending on soil conditions and how full the profile was, the crop may be reaching some drought stress with this method. Heavy dews overnight probably minimize the effectiveness of this approach, but some producers feel it is worthwhile. Irrigation resumes, keeping up with crop demand until shutoff, which occurs approximately Aug. 7 to 10.

For dry beans, the soil profile should be full prior to flowering. The field should then be allowed to dry to regain trafficability, the fungicide applied, and after the appropriate rainfast period, irrigated to fill the profile. The system should then be turned off to allow the surface to dry. This dries out the canopy and

Centre pivot operation.
Photo courtesy of Ministry of Agriculture

decreases the humidity in the microclimate around the plants, thereby lowering chances of infection. Dry beans have a lower peak water use rate than cereals, but a shallower root zone. Irrigation to keep the top foot between 60 and 95 per cent available moisture is the target. Work in Alberta has shown that dry beans take 90 per cent of their seasonal total water use from the top foot of soil. Usually, a second fungicide application is made 10 days to two weeks after the first at the late flower early pod stage.

Insect Pests of Fruit Crops in 2013

By Forrest Scharf, PAg
Provincial Specialist, Fruit Crops

Due to an exceptionally long winter in 2013, most of the orchards in the province were late to blossom and set fruit. Even so, most crops have been shaping up to be average to above average in quality and yield. Over the past several years, growers are getting better at effectively controlling disease problems, but in many cases marketable fruit quality and yield continue to be lost due to difficulty controlling insects that damage the fruit before harvest. In years when spring is relatively short and crop development is rapid, it is more challenging to employ controls during critical windows before and during blossoming, and during fruit development when adult insects first become active in significant numbers.

It is necessary to identify insect pests, understand their life cycles, and apply control measures at an appropriate stage of development to effectively control infestations. Often the times that offer the best control possibilities correspond with the time when it is equally important to control diseases and weeds. Disease and weed problems are usually easier to identify (and control measures are perhaps better understood), so it is natural that growers focus on these pressures when they arise in spring. With regard to insects, the most effective control measures are usually required when the populations are hardest to detect. In addition, growers have to consider beneficial insect populations (especially for pollination needs) and therefore have to make attempts not to kill those insects when they are targeting pests. In this way, it is understandable that insect problems can be difficult to manage.

Insects that have been notable in 2013 include: Tarnished Plant Bugs *(Lygus lineolaris)* on strawberries, raspberries and to a limited extent on saskatoons; Raspberry Fruitworm *(Byturus unicolor)* on raspberry; Spider Mites *(Tetranychus urticae*, et cetera) on strawberries, raspberries and saskatoons; Raspberry Crown Borers *(Pennisetia marginata)* on raspberries; possibly Black Vine Weevils *(Otiorhynchus sulcatus)* on strawberries and raspberries (unconfirmed); Strawberry Sap Beetles *(Stelidota geminata)* on ripening strawberries; Crickets in raspberries and strawberries; Dock Sawfly on apples (in the Northwest); Saskatoon Sawfly in saskatoon berries; as well as apple maggots and cherry fruit fly in apples and dwarf sour cherries.

With insects like tarnished plant bugs, crickets, mites and dock sawfly, eliminating weeds within and near the orchard will allow for significant reduction in the likelihood that infestation levels will become significant. Chemical controls at an early stage of insect development may also be required in affected plots. Control of raspberry fruitworm usually requires chemical controls to be applied pre-bloom according to label recommendations. Raspberry crown borers also require pre-bloom chemical controls, applied as a drench over the row in early spring to control larvae, whereas cane borers should be pruned and removed as soon as affected canes are detected

For more information on apple maggot and cherry fruit fly, please see the Crop Production News article written in 2012 regarding their life cycle and control methods at: www.agriculture.gov.sk.ca/cpn120907.

A new pest that has not been detected in Saskatchewan yet is the Spotted Wing Drosophila. Recent pest surveys in Quebec and Michigan have found these insects habituating in Haskap orchards and wild stands of saskatoon berry. Emergency use registrations for chemical control of Spotted Wing Drosophila have been obtained for Saskatchewan, so if these insects are detected control options will be available to affected producers. For more information, please contact forrest.scharf@gov.sk.ca.

Getting the Combine Ready for Crop Residue Management

By Ken Panchuk, PAg
Provincial Specialist, Soils

Chopping and spreading straw and chaff will be adequate for most fields. It is a critical first step for the success of zero-till or a min-till seeding systems. Fine cut straw choppers are now the standard in the industry, allowing the chopped straw and chaff to be spread uniformly over the width of the cut. These high performance choppers also require regular maintenance to be able to effectively handle a wide variety of crop types under variable harvest conditions. Keeping the flails and knives in good condition ensures that the straw chopper will do the job effectively and efficiently, even in flax. A well-maintained straw chopper is the key to ease of seeding.

Redekop straw chopper.
Photo courtesy of Redekop

Consider Tall Stubble

Tall stubble technology increases stored water in the rooting zone by trapping more snow, reducing evaporative losses and improving moisture use efficiency. The end result in most years for the Brown and Dark Brown soil zones is increased yield. However, to achieve this yield advantage adjustments have to be made to harvesting, residue management and seeding.

Tall stubble can be achieved by use of a straight cutting header or a stripper header. The straw needs to be chopped and the chaff and chopped straw need to be spread over the entire width of the header cut. Fine cut straw choppers on most combines today can perform this task very well.

The next step, the selection of proper zero-till seeding equipment, is critical. Seeders with knife or disc openers can use GPS guidance and a smart-hitch to seed between the rows of the previous crop without plugging.

The first noticeable advantage of tall stubble technology is that it will collect more snow. Since water is the most yield-limiting factor in the Brown and Dark Brown soil zones, collecting more snow is definitely the right start. This is especially true in the drier areas of the Brown soil zone where the subsoil is generally not fully recharged going into winter. The photo below shows the difference in snow trapping between short and tall stubble.

Snow trapping using tall stubble technology.
Photo courtesy of Agriculture and Agri-Food Canada

Seeding between the row in tall stubble.
Photo courtesy of Agriculture and Agri-Food Canada

"Seeding between the rows" technology is also effective for winter cereal planting. This leaves most of the stubble standing to catch the first insulating blanket of snow to help prevent winter-kill.

Sprayer Tank Cleaning Critical After Every Use

By Clark Brenzil, PAg
Provincial Specialist, Weed Control

There seems to be a larger than typical number of samples being received by the Crop Protection Laboratory where the diagnosis is herbicide carryover in sprayer tanks. Most often the cases are related to either Liberty applied to LibertyLink canola or one of the pulse products that are applied with Merge adjuvant such as Odyssey or Solo. The adjuvants in these products are very effective in removing any residues that remain in the sprayer tank as a result of inadequate cleaning practices. They are particularly effective when left in the sprayer plumbing for a longer period such as overnight.

There are a couple of key indicators that damage to a crop has occurred from residues remaining in the sprayer. Firstly, the damage symptoms will appear a short time after an in-crop application of pesticide with an adjuvant prone to cleaning.

A short, concentrated strip on the initial entry to the field followed by a tapering of the damage from one end of the boom to the other is a clear indication of failure to clean the boom from previous applications. The distance of the strip equals the volume of spray solution remaining in the boom plumbing only.

Failure to clean the tank, main plumbing and filters results in a different damage pattern in the field. When the contamination originates in the circulatory plumbing of the sprayer or the tank itself, the contaminant residues become incorporated into the entire load being mixed and an entire tank load may be impacted. If the contamination occurred because of a simple operator error of forgetting to empty the contaminant herbicide before filling for the new field, the damage is largely contained to a single tank load as the next load is too dilute to injure.

However, the greatest proportion of tank contamination cases diagnosed by the Crop Protection Lab are as a result of buildup of a previous herbicide on the internal parts of the sprayer and then the gradual removal of that herbicide when applying several tanks of a herbicide with strong cleansing adjuvants to the new crop. This type of carryover can and frequently does occur, even after several tanks of another herbicide without a cleansing adjuvant, are applied between the contaminant herbicide and the new crop. In the vast majority of cases, the damaging contaminant is a Group 2 herbicide, since these are able to cause injury to crops such as canola and pulses at miniscule rates.

In these cases the pattern can take on two forms depending on how the first tank was mixed. If the first tank had the herbicide for the new crop added early in the loading process, the first tank load applied to the field displays the greatest injury and subsequent tanks show progressively less injury until the contamination has been completely removed and no injury is apparent. The second common pattern is suspected to occur when the first tank is nearly full of water before the new herbicide is added. In this case the herbicide with the cleansing adjuvant is not in the tank long enough before spraying starts to result in high enough concentrations of the contaminant herbicide to enter the spray tank. As a result, the first round of the field is uninjured. While the second tank

Tips to help with avoiding tank carryover problems from occurring:

- Avoid allowing herbicide solution to remain in sprayers that are sitting idle, even if the sprayer will be applying the same product the next time it is used. At minimum, rinse out the sprayer with water to empty the plumbing.
- Clean tanks with a combination of ammonia and detergent or a commercial tank cleaner with multiple cleaning actions. In many cases of tank carryover, the contaminant herbicide was applied in a mix with a pesticide with an oily formulation. Even though kitchen products with ammonia claim "grease cutting action" a detergent is still better at breaking down oily, greasy or fatty deposits. Ammonia is primarily used to increase the pH of the cleaning solution which in turn increases the solubility of the herbicides it is recommended for.
- Clean sprayers when changing products, even when they are intended for the same or similar crops. The second product may simply coat more layers over the contaminant herbicide residues making the contaminant more difficult to remove at a later date.
- Avoid mixing different formulations of the same active in the same tank load. Manufacturers report incompatibilities between the various formulations that cause them to precipitate (create solids) out of the solution that can adhere to sprayer surfaces. Alternatively, contact the herbicide manufacturers of both formulations to determine compatibility.

load is being filled and mixed the spray solution with the cleansing adjuvant remains in the plumbing of the sprayer and continues to remove the contaminant herbicide from the surfaces. When the sprayer is agitated the contaminant enters the rest of the spray solution and results in the greatest injury to the second tank rather than the first. Subsequent tanks are progressively less injured as in the first form.

Swede Midge Questions and Answers

By Scott Hartley, PAg
Provincial Specialist, Insect and Vertebrate Pest Management

1. *What is the swede midge?*

Figure 1: Swede midge adult. *Photo courtesy of Susan Ellis, USDA APHIS PPQ, Bugwood.org*

Native to Eurasia, the swede midge is a small (1.5 to 2 mm) fly, similar in size to the wheat midge. Both of these midge species belong to the fly Family Cecidomyiidae. The adult swede midge is light brown in colour. Figure 1 depicts a typical swede midge. It is difficult to tell the difference between this and other non-pest midge species.

The swede midge larva differs from wheat midge in colour. Swede midge are creamy yellow rather than orange. A unique feature of swede midge larvae is that they can "jump" or spring away from contact.

2. *Where in Saskatchewan has swede midge been found?*

The swede midge *(Contarinia nasturtii* (Keifer)) is a new pest to Saskatchewan. It was first collected in the Nipawin, Melfort and Yorkton areas by the Canadian Food Inspection Agency (CFIA) in pheromone traps in 2007 and 2008. The first report of swede midge damage in canola in Saskatchewan was in 2012.

Pheromone traps were set up for monitoring of the swede midge in vegetable crops (Saskatoon and Qu'Appelle Valley) and canola in the northeast from 2008 to 2011. No swede midge were collected in traps and no symptoms were observed during this period and monitoring ceased.

In 2012, significant damage was noted in a canola field in the Tisdale/Nipawin area. Due to this event, a survey was conducted to determine the extent of swede midge damage and larvae in 2012 (coordinated by Agriculture and Agri-Food Canada) based on areas where the insect was previously found. Canola fields in the Codette, Nipawin and Carrot River areas surveyed on July 18-20, 2012, were found to contain midge larvae but no significant damage was noted. Symptoms included aborted flowers or flowers with petals apparently fused or glued together, and misshapen, stunted or sometimes missing pods. In the Yorkton area no symptoms of damage were observed.

3. *What plants does the swede midge feed on?*

The swede midge larvae feed only on cruciferous plants. This includes field crops such as canola and vegetable crops such as cabbage, broccoli and cauliflower.

4. *What is the life cycle of the swede midge?*

This insect overwinters in the soil as a pupa. The first spring adults appear in mid- to late May in eastern Canada. Several generations of swede midge can occur in a growing season. In Ontario, where the swede midge was first reported in Canada, there are four or possibly five overlapping generations of swede midge a year. With different environmental conditions in Saskatchewan there are likely to be fewer generations in this province. Due to the recent introduction of this pest, specific information on the life cycle and number of generations of the swede midge is unknown.

Figure 2 – Swede midge infested canola flowers. *Photo courtesy of Lyle Cowell – Viterra*

Figure 3 – dissected flowers and swede midge larvae (arrows indicate two larvae). *Photo courtesy of Lyle Cowell – Viterra*

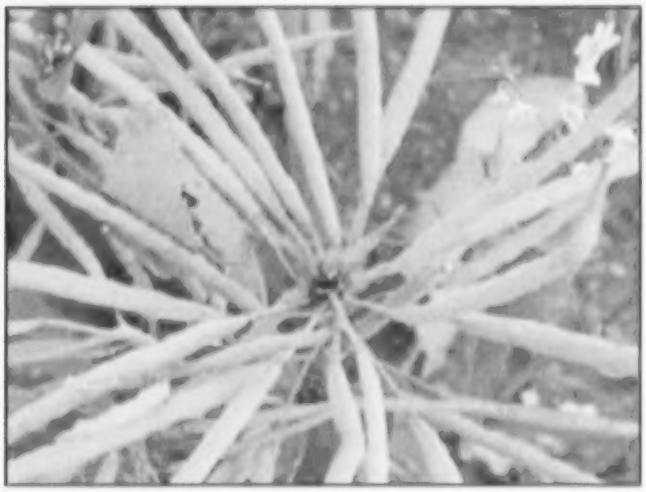


Figure 4 – "bouquet" of canola pods from swede midge feeding on growing point.
Photo courtesy of R. Hallett – University of Guelph

5. What are symptoms of swede midge feeding and what kind of damage does this insect cause?

In Saskatchewan, damage in 2012 included canola plants with aborted flowers or flowers with petals apparently fused or glued together, and misshapen, stunted or sometimes missing pods.

The image (previous page) provides an indication of the relative size, shape and colour of the larvae that can be found in the flower.

In Ontario, swede midge have been found to attack canola plants earlier, at the bud stage with feeding on the growing point of the plant producing a witch's broom of pods on the end of branches or stems.

The above image shows the typical growing point damage that has been noted in Ontario. Keep in mind that there are other causes of similar multi-branching type symptoms, such Group 2 herbicide damage.

6. What is the economic threshold for the swede midge?

There are no economic thresholds developed for this pest in field crops in Canada.

7. Are there insecticide control options for swede midge?

Matador and Silencer (active ingredient lambda-cyhalothrin) and Coragen (active ingredient chlorantraniliprole) are registered for control of swede midge in canola.

However, there are several factors related to this pest including timing of effective control (overlapping and multiple generations of the swede midge, short adult life span, and the concealed nature of larval feeding) as well as limited distribution within the province and within fields.

Therefore, the Ministry of Agriculture does not recommend insecticide application for control of the swede midge.

8. What other factors should be considered about insecticide application to control swede midge?

There is cost and definite risk associated with indiscriminate applications of insecticides:

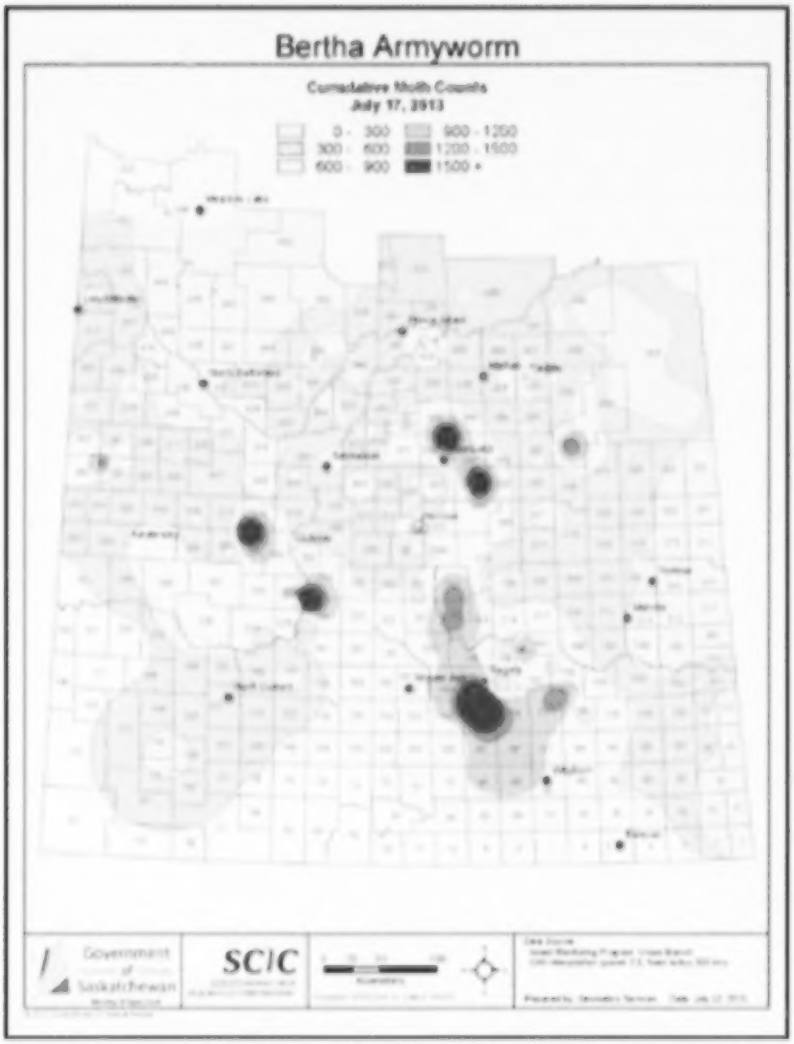
- Unnecessary expense and labour required for inadequate control of the pest.
- Negative effects on beneficial insects like parasitic wasps that control other pests such as bertha armyworm.
- Bees will be adversely affected by insecticides if used when the crop is flowering. Pollinators can provide a yield increase even in hybrid canola.
- Use of an insecticide may limit control options for other more damaging insects like bertha armyworm later in the season.

Bertha Armyworm Monitoring Program

By Brian Olson, AAg
Integrated Pest Management Agrologist

The 2013 Bertha Armyworm monitoring program once again collects and compiles data from co-operators located across the province. Collection begins in late June and extends to early August. The data is used to produce a risk map which is updated weekly until early August when the traps are removed from the fields. The map is posted on the Saskatchewan Agriculture Website at www.agriculture.gov.sk.ca/maps_section.

The latest map indicates high moth numbers in areas that are in close proximity to areas that are low in moth populations. This emphasizes the importance of individual field scouting in determining potential larvae numbers (see next page).



At this time, numbers have been highly variable with some areas reporting very high counts while other areas have seen low adult moth counts. Adult emergence is dependent on accumulated heat units which were high enough to trigger emergence in large numbers by the week of July 3 in some areas.
The week of July 10 saw numbers decline in 65 of the 190 reporting sites, indicating that peak emergence may have passed in those areas.

Co-operators in RMs 127, 129, 222, 250, 286, 339, 366 and 464 have reported accumulated counts in excess of 1200 male moths. This indicates that these areas are at high risk for larvae infestations.

General recommendations for total accumulated moth numbers collected from pheromone traps are:

- 0 to 300 = low risk, control measures unlikely in most cases.
- 300 to 900 = uncertain, most variability for this level, periodic monitoring of fields to verify actual numbers of larvae (especially bolting fields) is required.
- 900 to 1200 = moderate risk; check for larvae and evidence of damage.
- 1200 or more = high risk; monitor fields frequently.

Individual field monitoring is the most accurate method of determining actual numbers of destructive larvae. Scouting should begin seven to 10 days after the appearance of adult moths and continue until economic thresholds are reached and the crop is sprayed, or until the crop is swathed. Sample at least three locations within a field at least 50 metres apart. The locations should be indicative of the entire field, excluding headlands and the centre of the field. At each location, remove the plants from one square metre and shake over a cardboard box, hood, tailgate or some light coloured background. Count the dislodged larvae being sure to include any larvae on the ground where the plants were removed.

Table 1. Economic thresholds for Bertha armyworm in canola.

Spraying Cost ($/acre)	Expected Seed Value ($ per bushel)										
	6	7	8	9	10	11	12	13	14	15	16
	Number of Larvae / metre² *										
6	17	15	13	11	11	10	9	8	7	7	6
7	20	17	15	13	12	11	10	9	9	8	8
8	23	20	17	15	14	13	12	10	10	9	9
9	26	22	19	17	16	14	13	12	11	10	10
10	29	25	22	19	17	16	15	13	12	11	11
11	32	27	24	21	19	17	16	14	13	13	12
12	34	30	26	23	21	19	17	16	15	14	13
13	37	32	28	25	22	20	19	17	16	15	14
14	40	35	31	27	24	22	20	19	17	16	15
15	43	37	32	29	26	23	22	20	19	17	16
16	46	39	34	31	28	25	23	21	20	18	17

* Economic thresholds for bertha armyworm are based on an assumed yield loss of 0.058 bu per acre for each larvae per metre².

Economic thresholds for Bertha Armyworm vary based on canola prices and the cost of insect control (insecticide plus application cost). Use the current crop value and the insecticide/application costs in Table 1 to determine the number of larvae per square metre at which an insecticide treatment in canola is warranted. Remember to check the pre-harvest interval for the insecticide being applied.

Crop Protection Laboratory News July 1-15, 2013

By Cecilia Peluola, PAg
Crop Protection Laboratory

Sample submissions to the laboratory in the first two weeks of July continue to increase. Diseases and disorders were significantly higher. Root rots symptoms were higher on pea, lentil and chickpea. Leaf spots such as tan spots and septoria leaf spots were high on durum samples submitted. A common wheat sample tested positive for wheat streak mosaic virus (WSMV). Herbicide injury was observed on pea, lentil, chickpea, canola, wheat and raspberry samples. Among the submissions were a number of cases of herbicide drift injury and improper herbicide sprayer tank cleaning injury (See the article on page 5 for more information on the importance of proper tank cleaning). Herbicide injury was observed on both broadleaf and grassy crops.

Important diseases/disorder:

- Root rot of lentil and pea – *Rhizoctonia solani, Pythium and Fusarium* sp
- Tan spot of common and durum wheat – *Pyrenophora tritici-repentis*
- Winter wheat heat damage – prematurity blight
- Chemical/ environmental damages were also diagnosed on lentil, canola, wheat, peas and raspberry.

Weed samples submitted are as follows:

- Blue grass – *Poa compressa*
- Japanese brome – *Bromus japonicus*
- Philadelphia fleabane – *Engeron philadelphicus*

Crop Questions of the Week Agriculture Knowledge Centre

By Brent Flaten, PAg, CCA
Integrated Pest Management Specialist

During the past week the Agriculture Knowledge Centre has been receiving calls primarily on wheat midge and fungicide timing for Fusarium Head Blight in wheat, and various diseases in peas, lentils and canaryseed. Although the window for controlling these diseases and insects are rapidly coming to an end, there are some issues to think about for late seeded crops and for next year.

There have been quite a few calls on spraying for both Fusarium Head Blight and wheat midge at the same time. In the last edition of Crop Production News dated July 10, 2013, Sean Miller covered the proper timing to spray for Fusarium Head Blight which is from when 70 per cent of the heads are fully emerged to when 50 per cent of the heads on the main stem have visible anthers. The susceptible stage of wheat midge on the other hand is from the time the boot splits exposing the emerging wheat head to the air, until anthers start to show in the head. If wheat midge economic thresholds have been reached and the environment is conducive to Fusarium Head Blight, some producers are trying to spray for both in one application. This is very difficult to do since there is very little overlap in the application timing for these two pests.

Numerous producers are still trying to control diseases such as mycosphaerella in peas, anthracnose in lentils, or sclerotinia in either peas or lentils after the crop canopy closes. As the crop canopy closes, the environment is much more conducive to disease development due to the lack of air movement and potentially damp conditions down in the crop canopy. Wider seed row spacing can often reduce disease risk by allowing more air movement through the crop allowing it to dry out after rains or dews. Although the risk of disease development increases after canopy closure, it is very difficult for fungicide sprays to penetrate down into the crop canopy where the fungicide is needed. Remember that fungicides do not move up and down the plants nearly as much as systemic herbicides.

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